

## Government resolution on technology policy

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## 1. The purpose of the resolution on technology policy

‘Dynamic and thriving Finland’ is one of the strategic themes of the Programme of Prime Minister Sanna Marin’s Government. One of the aims in this theme area is to make Finland a recognised frontrunner in technological advances, innovative procurement, and the culture of experimentation. To support this aim, a joint technology advisory board between the public and private sector was appointed on 16 September 2020 in accordance with the Government Programme. The Advisory Board was tasked with preparing a technology policy that creates wellbeing for Finland, steers Finland’s competitiveness and is driven by digitalisation. The Advisory Board published its report, “Finnish technology policy in 2020s – A global leader through technology and information”<sup>1</sup>, on 1 June 2021. The proposals made in the report have been put to use in drafting this resolution.

Our operating environment and competitive landscape has changed, and technology has played a significant role in these changes. Technology does not merely represent a machine, device or technical doctrine. Instead, technology has become a daily aspect of our living environment as a result of numerous technological transformations. The impacts and benefits of technology extend to various administrative branches and sectors, and technology policy is implemented in all administrative branches. Consequently, the responsibility for the decisions and inputs related to the development and utilisation of technology is divided between various parties. Finland is a strong technology country, and we have an excellent foundation for even more determined development and utilisation of technology and the continued creation of the conditions for a welfare society in the future. To pursue the determined development and utilisation of technology, Finland needs to have a technology vision that is shared between the various administrative branches. How will we achieve our desired future through the utilisation of technology? A shared vision enables the strategically coherent development and utilisation of technology in Finland. For a small country, coherence is an asset in the face of changes in the global economy.

This resolution sets out the shared goal of Finland’s technology policy and the objectives to which the Government and ministries will commit. The resolution outlines the key tools for promoting the achievement of the set goals and which the ministries will commit to implementing in their respective areas of responsibility in 2022–2023 to the extent allowed by the resources available to them. Actions that require funding will be discussed and decided on separately in budgeting and general government fiscal planning processes. The achievement of the goals presented in this resolution will also be influenced by a number of projects that have been started previously or are currently pending<sup>2</sup>. The aim is for the technology policy goals outlined in this resolution to be promoted across government terms of office, and a monitoring model needs to be established to support long-term efforts to achieve the objective set out in this resolution.

In monitoring and steering the implementation of the resolution, the secretariat of the Technology Advisory Board will be utilised along with the ministerial working groups to whose administrative branch the actions and objectives relate. The overall progress will be monitored by the Ministerial Working Group on Developing the

<sup>1</sup> [Finnish technology policy in 2020s – A global leader through technology and information](#)

<sup>2</sup> For example, the implementation of Finland’s Sustainable Growth Programme, the work of the Parliamentary Working Group on Research, Development and Innovation, the RDI roadmap, the sustainability roadmap, Finland’s digital compass, the programme for exports and international growth, the strategy for the renewal of industry, the entrepreneurship strategy, the Government Resolution on improving the level of information security and data protection in critical sectors of society, the Government Resolution on the Cyber Security Development Programme, the Government Resolution on the Strategic Programme for Circular Economy, the Education Policy Report, the sectoral low-carbon roadmaps, and the parliamentary working group on Veikkaus’ compensation. [The Finnish version of the Government Resolution also includes appendices 1–4 listing the actions pending in December 2021, which the Technology Advisory Board had proposed in its report. The appendices have not been translated into English.]

Digital Transformation, the Data Economy and Public Administration with the help of the Coordination Group for Digitalisation. The implementation of the resolution will also be monitored annually as part of the planning of the ministries' activities and finances.

## **2. The background for the resolution on technology policy**

### **2.1. The basis for a technology policy**

Technology policy aims to enhance the development and utilisation of technologies and a supporting operating environment for companies and civil society. The basis for a technology policy is that technology choices are made on a market-driven basis, which is known as technology neutrality. This resolution focuses particularly on technology policy that is driven by digitalisation. Companies play an important role in the development and application of technology, but this cannot be achieved without having people with the right competencies and qualifications. This is one reason why close cooperation between the public sector and the private sector is a prerequisite for effective technology policy. The public administration is also involved in the development and utilisation of technology in various ways. Technology policy is cross-sectoral by nature. This also means that technology policy can strengthen and improve security and wellbeing throughout society.

Competition in the development and utilisation of technology is continuously intensifying around the world, both between nations and between companies. Technological development has impacts on foreign policy and security policy. Technologies create new vulnerabilities, such as cyber threats. Finland should take advantage of international partnerships, the EU's internal market and cooperation between the Schengen countries to improve its competitiveness and take on an increasingly prominent role in key international forums when it comes to technology-related issues. The coming years will determine the position of Finland and Finnish companies with regard to influencing technology policy and competing in the field of technology. Finland has a genuine opportunity to establish a profile as a strong expert in technology and an opinion leader in international technology policy. Establishing a strong profile for Finland as a country would also support the internationalisation and cooperation opportunities of companies and serve as a pull factor for Finland.

Accelerating the development of technology also requires identifying related risks and managing them through regulation, for example. Digitalisation, for instance, requires that data protection is ensured, and healthy competition in the markets must be ensured by preventing the type of market consolidation that has an adverse impact. The role of corporate responsibility is also highlighted in this respect. Finland must actively participate in the development of regulation and the operating environment concerning technology also on the international stage, including the EU.

Achieving an internationally high profile in technology requires a long-term policy that extends across government terms of office as well as cross-sectoral cooperation to achieve the shared objectives. For example, the Ministerial Working Group on Developing the Digital Transformation, the Data Economy and Public Administration is charged with coordinating digitalisation-related policy, and corresponding structures will also be needed in the future.

## **2.2. Wellbeing through the development of technology**

In spite of the challenges, Finland is in an excellent position in many ways. For example, we have a stable and predictable operating environment and a high level of education and competence, we are a welfare society and we are often ranked as the happiest country in the world. In the area of digitalisation, we are among the leaders in Europe, and technology traditionally has a strong position as a driver of wellbeing in Finland. This provides an excellent foundation for tackling the existing challenges of our changing world through the use of technology, as the key to success lies in the ability to seize the opportunities presented by the changes and offer solutions to them. By being a provider of solutions, Finland has everything it takes to establish a permanent position as a global leader in technological development.

Technological transformations have always changed our operating environment, thinking and actions. A significant difference between the present changes and the previous technological transformations is that today's advanced technologies and technological solutions are almost always based on the ability to utilise information as part of the solution. This applies equally to traditional industrial activities and to digital companies and services. The key question is how we can utilise technology and data to solve the challenges we face and achieve our desired future as a nation.

Technology, skilled labour, technological development and technology companies are needed for the creation of new jobs and wellbeing. Through technology, data and high-level competence we can also produce higher added value products and services, making it profitable for companies to grow and invest in Finland. Productivity and the creation of even higher added value can be achieved by providing more support to companies' innovation activities, increasing the quality of research and the relevance of research themes to companies, by encouraging companies and research institutes to cooperate, and by ensuring the availability of highly competent workers with a high level of wellbeing.

Technological development also provides numerous opportunities for the production of human-centred, high-quality and efficient public services. By utilising data and artificial intelligence, for example, proactive and human-centred services can even prevent illnesses entirely, allow elderly people to live at home longer and, through more effective early-stage care, for instance, reduce later-stage service needs. The growth of wellbeing is a key impact of the use of technology.

Climate change and biodiversity loss are key global challenges and, simultaneously, important themes of research and innovation activities, where Finland is in a position to punch above its weight to a significant extent. For example, Finland's carbon neutrality targets are among the most ambitious in the world. Beyond that, Finnish technology can reduce adverse climate impacts to an extent that exceeds many times over the effect of reducing Finland's own carbon footprint to zero. This is known as increasing Finland's carbon handprint, and it should be one of the key goals of Finnish technology policy. Being a frontrunner in the digital green transition will create new high added value exports, growth and jobs in Finland.

## **3. The key objectives of Finland's technology policy**

The Finnish Government commits to promoting the technology policy objectives set out in this resolution, and the ministries will start to put the objectives into action throughout the public sector. The aim is for the technology policy goals outlined in this resolution to be promoted across government terms of office.

### 3.1. The ultimate goal of the technology policy

The ultimate goal of the technology policy is that, in 2030, Finland will be the most successful and best-known country in the world that generates wellbeing from the research, development and utilisation of technology.

Four objectives have been set to achieve this goal (Figure 1):

1. Finland will be one of the most competitive nations in the world and the world's best place for technology companies.
2. Finland will be home to many of the world's best-known and most attractive concentrations of technology education, research, skills and investments.
3. Finland will have the world's most favourable public sector towards technology and innovation, which will provide the basis for the wellbeing of individuals and undertakings.
4. Finland will benefit extensively from boldly developing and applying technologies that respond to global challenges.



**Figure 1.** The objectives that will see Finland emerge as a global leader through technology and information

To make these objectives more concrete, each objective is divided into three action areas that are presented in section 3.2. The objectives are geared towards long-term and broad-based development that should continue across government terms of office, and the actions<sup>3</sup> should be specified further as things develop. In addition to setting objectives, it is important to monitor their achievement and to create a monitoring model for this purpose (section 4).

The inputs and actions required to achieve the set objectives are the responsibility of the relevant administrative branches. The actions required by the objectives set out in this resolution will be implemented within the framework of the state budget and existing appropriations. Increases in appropriations or other

<sup>3</sup> The Technology Advisory Board's report presents 42 action proposals that promote the achievement of the set objectives [Finnish technology policy in 2020s – A global leader through technology and information – Valto \(valtioneuvosto.fi\)](#)

actions that have budgetary impacts will be decided on separately in state budget spending limits and annual budgets.

### 3.2. The objectives that will see Finland emerge as a global leader through technology and information

#### 3.2.1. Objective 1: Finland will be one of the most competitive nations in the world and the world's best place for technology companies

Going forward, Finland needs to continue to be a competitive operating environment for technology companies, which supports Finland's goal of being permanently among the world's most competitive countries. To support this objective, three tools have been defined for creating an operating environment that is favourable to technology companies (Figure 2):

1. Innovation-friendly and technology-oriented public sector and regulation
2. Strong inputs in R&D activities and the commercialisation of research
3. Incentives for innovation and investment



**Figure 2.** Objective 1: a competitive operating environment for technology companies

The operating environment needs to support the broad-based utilisation of technology in the public sector to improve services and increase operational efficiency. The operating environment also needs to support the creation of technology companies and innovations of all sizes, as well as Finnish technology exports. The development of technology to benefit society as a whole – including improving productivity, mitigating climate change and preventing biodiversity loss – requires changes in culture and attitudes that make it possible to do things in entirely new ways by joining forces between various parties. Technology solutions must be ecologically sustainable, and they are also needed to ensure the adequacy of limited natural resources. Also needed is a regulatory environment that facilitates these developments in relation to the acquisition, use and management of data, for example, as the utilisation and development of technology is dependent on the availability of digital information.

Inputs in an innovation environment for companies support the creation of an internationally competitive, attractive and growing innovation ecosystem in Finland. The public sector plays a significant role as a facilitator; for example, innovative public procurement can be seen as a strategic tool in the commercialisation of new technological innovations. The public sector needs to create the prerequisites for the market-based

development of technologies and the fast-track testing of different technologies and business models. This also requires an ambitious R&D goal and strong inputs in basic research. The Government has set a goal of increasing Finland's research and development expenditure to four per cent of GDP by 2030. The same goal was expressed in the final report of the Parliamentary Working Group on Research, Development and Innovation published in December 2021<sup>4</sup>. An active and open technology policy will also attract international investment to Finland, which will particularly help develop the operating environment for technology companies.

### 3.2.2. Objective 2: Finland will be home to many of the world's best-known and most attractive concentrations of technology education, research, skills and investments

Finland should adopt a broad range of different policy measures to ensure a smooth path towards a knowledge-based society, which will see Finland develop into the world's most attractive concentration of competence in the technology sector and an exporter of technology. A further goal is that citizens and companies can benefit from the advantages of technological development as broadly as possible. To achieve these objectives, three tools have been defined for Finland to develop into a knowledge-based society that has the world's leading experts in the technology sector (Figure 3):

1. Enhancing skill levels and taking a digital leap in learning
2. Making work-based and education-based immigration attractive and streamlining the process
3. Establishing an international profile for Finland as a high technology country



**Figure 3.** Objective 2: the world's most attractive concentration of technology competence

At all levels of education, the Finnish education system needs to encourage and support pupils and students to develop their skills so that the prerequisites for the development and utilisation of technologies are strengthened. In addition to focusing on science, technology, engineering and mathematics (STEM), it is important to also focus on humanities and social sciences. Finland needs to offer development opportunities for leading experts and promote digital equality and accessibility. A digital leap in higher education and massive inputs in lifelong learning are required to respond to the new competence needs created by the transformation of work<sup>5</sup>. It is important to ensure broad and high-level education in various fields of technology as well as academic disciplines that support the development of technology. It is also important to

<sup>4</sup> [Final Report of the Parliamentary Working Group on Research, Development and Innovation](#), 2021

<sup>5</sup> Inputs in competent professionals and the development of competence were also highlighted in a report by the Ministry of Economic Affairs and Employment in spring 2021. [Sustainable economic growth and our future wellbeing](#), pp. 66–74

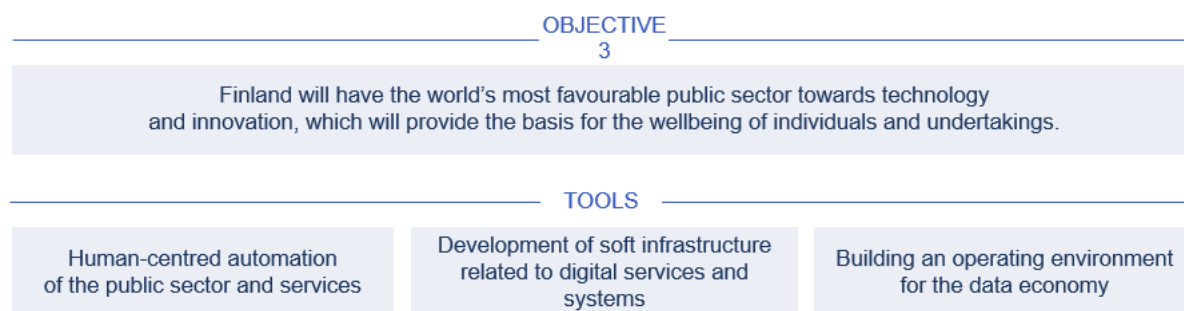
ensure that nationally critical intellectual capital is maintained and developed. A labour force with a high level of competence that matches labour market needs, and R&D investments, promote the growth of productivity through increased innovation. Universities and cooperation between companies and universities play an important role in this respect. The development of technology also requires a substantially larger number of foreign professionals than Finland currently has in the labour market. Work-based and education-based immigration needs to be made convenient and attractive through streamlined permit procedures and digital service paths.

A strong national technology profile serves as a calling card and as a tool of influence in international cooperation, creating opportunities for companies and Finnish products and services, and attracting international investment to Finland. Technological leadership requires strong basic research, especially in STEM, as well as in-depth expertise in technologies and high-level applied research. Also needed are research-based competence ecosystems that attract professionals to Finland and help retain them. Technological leadership requires international partnerships, active policy work in international forums, a strong position in international organisations and having international organisations locate their operations in Finland.

### 3.2.3. Objective 3: Finland will have the world's most favourable public sector towards technology and innovation, which will provide the basis for the wellbeing of individuals and undertakings

Finland needs to be a safe, participatory and proactive society that serves the need of all citizens and companies smoothly, seamlessly and efficiently. To achieve this objective, three tools have been defined for Finland to benefit from the creating the world's most favourable public sector towards technology and innovation (Figure 4):

1. Human-centred automation of the public sector and services
2. Development of soft infrastructure<sup>6</sup> related to digital services and systems
3. Creating the operating environment for the data economy



**Figure 4.** Objective 3: The world's most favourable public sector towards technology and innovation will provide the basis for the wellbeing of individuals and undertakings

<sup>6</sup> Digital soft infrastructure refers to the infrastructure related to digital services and systems, such as institutions, services, standardised specifications and agreements. Soft digital infrastructure, such as trust infrastructure and interfaces, is a prerequisite for the utilisation of data by the public administration and industrial operators as well as the progress of digitalisation and automation. Soft infrastructure creates an operating environment where all participants can build their digital activities on the same foundation instead of implementing their own foundation and having to struggle with compatibility challenges.



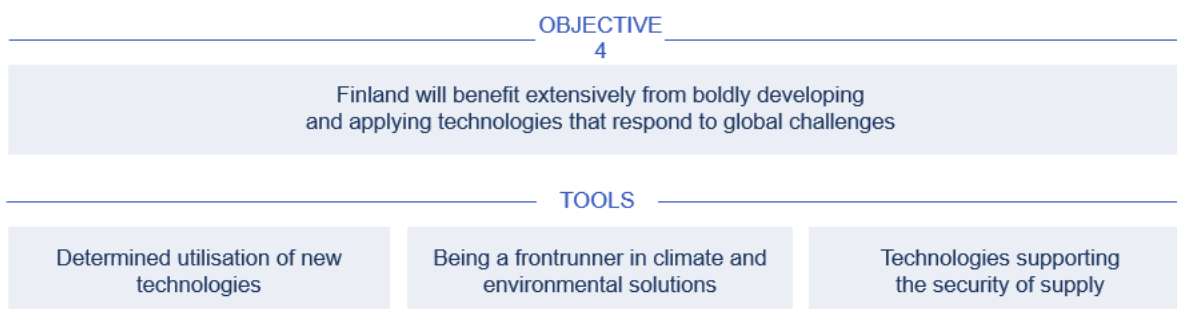
Finland needs to actively pursue the automation of the public administration and services, as technology can help streamline and improve public services and processes. Automation and digitalisation need to be utilised in human-centred and streamlined services when the goal is to promote wellbeing and the realisation of democracy and fundamental rights. The digitalisation of public services must not create obstacles to the accessibility of services, and the needs of different population groups, such as people who are ill or elderly, must be taken into account in services. It is also necessary to support the development of people's digital skills in educational institutions and by promoting lifelong learning through the digital support model, for example. A cross-administrative approach and close cooperation between the administrative branches are prerequisites for the utilisation of technology in the public administration. This also calls for technology competence that creates the foundation for building a culture that is favourable to technology and innovation.

The digitalisation of the public and private sectors and the use of technologies require inputs in soft digital infrastructure; for example, trust services such as a digital identity platform, interfaces ensuring interoperability, structures ensuring the quality and reliability of information, and information security. The development work must be carried out across sectoral boundaries as a joint effort by the public and private sectors and in accordance with international standards. Finland also needs to consider that the European foundation for the data economy will be established in the coming years, which makes it necessary for Finland to actively influence matters such as EU regulation concerning soft infrastructure. Through active influence, Finland can participate in the creation of European digitalisation based on Finnish solutions, while also ensuring the better use of data. Finland must facilitate – through legislation, for example – a competitive development, testing and operating environment for platform economy business activities where large quantities of data are effectively utilised, and where research and related infrastructures also play a role. It is also essential to make use of the existing infrastructures and ensure their long-term development.

#### **3.2.4. Objective 4: Finland will benefit extensively from boldly developing and applying technologies that respond to global challenges**

Finland must be actively involved in solving global challenges through technology and create socially, ecologically and economically sustainable wellbeing not only in Finland but also globally. To achieve this objective, three tools have been defined for Finland to benefit from the development and application of technologies responding to global challenges (Figure 5):

1. Determined utilisation of new technologies
2. Being a frontrunner in climate and environmental solutions
3. Technologies supporting the security of supply



**Figure 5.** Objective 4: Finland benefits from the application of technologies responding to global challenges

Finnish universities, research institutes and companies need to develop world-class expertise, as Finland's growth and renewal require not only a high level of technological capabilities but also a high level of business competence and creative capabilities. Finland needs to develop and quickly adopt technology and comprehensive solutions that will make Finland the world's first carbon neutral circular economy, while protecting biodiversity and increasing Finland's carbon handprint. Finland has everything it takes to punch above its weight when it comes to this theme.

Finland needs to be actively involved in the development of European technological strengths and exercise influence on the creation of a highly functional and internationally competitive internal market. It is also important for the private sector and the NGO sector to play an active role in establishing objectives related to exercising influence at the EU level. This will help increase Finland's resilience and ability to emerge from crises. Finland needs to have an operating model and technological capabilities that suit various crises and exceptional circumstances and enable the security of supply, information security and effective cross-sectoral coordination. To this end, comprehensive security needs to be addressed in technology policy, particularly with regard to cyber security.

#### 4. Implementation, monitoring and performance indicators

A monitoring model needs to be established to ensure the achievement of the goal of the technology policy, as set out in this resolution, and the related objectives. Monitoring the achievement of the objectives requires that the desired key results and quantitative performance indicators are defined, and the monitoring model must facilitate the monitoring of progress towards the objectives on two levels:

1) Monitoring *actions*. While the resolution does not include a separate action plan, related actions have already begun to be implemented and there are plans to initiate actions by various ministries, which will also monitor the progress of those actions<sup>7</sup>. Monitoring the progress of these actions collectively will make it possible to establish an overall view of the achievement of the objectives set out in the resolution. Monitoring data will enable quick reactions if the desired progress towards the objectives is not made, and monitoring will also help respond to changes in the operating environment.

<sup>7</sup> The appendices to the Finnish version of the resolution list the actions already initiated by various ministries, and which were proposed in the Technology Advisory Board's report. Other actions related to the resolution are also under way. The appendices have not been translated into English.

2) Monitoring *the objectives* with the help of key results and quantitative indicators. The key results and indicators need to be set at an ambitious level so that they reflect the achievement of the selected objectives and also facilitate international comparisons. As information on the achievement of key results is generally delayed, the achievement of the objectives also needs to be monitored by means of separately defined proactive indicators.

The monitoring model will increase the probability of achieving the objectives of the technology policy and other policy sectors by enabling more systematic and transparent monitoring. The monitoring model will enhance the coordination and implementation of proposals made in various projects by compiling proposals from different projects on a single platform that also enables a monitoring view for citizens and stakeholders. This will make it easier and more effective to build on past efforts. The monitoring model will also increase openness, provide decision-makers and public officials with access to a new information repository, and provide a better overall view of the reforms for all parties involved.

In monitoring and steering activities, the secretariat of the Technology Advisory Board will be utilised along with the ministerial working groups to whose administrative branch the actions and objectives relate. The overall progress will be monitored by the Ministerial Working Group on Developing the Digital Transformation, the Data Economy and Public Administration with the help of the Coordination Group for Digitalisation. The implementation of the resolution will also be monitored annually as part of the planning of the ministries' activities and finances.